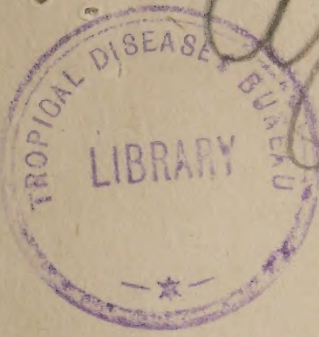
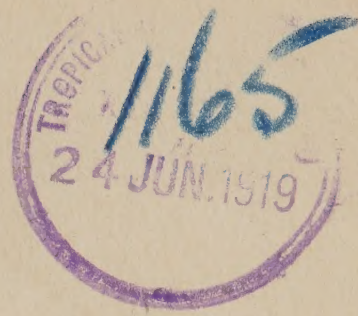




Malaria



SUGGESTIONS
FOR THE
CARE
OF
MALARIA PATIENTS.

Drawn up for the information of Medical Practitioners

BY

COLONEL SIR RONALD ROSS, K.C.B., K.C.M.G., F.R.S.,

Consultant in Malaria to the War Office and the Ministry of Pensions,

AND

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formerly with the Royal Society's Malaria Commission, and Secretary
to the Committee for the Study of Malaria in India.*

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INTRODUCTORY.

Among the men now being demobilised from the Army and other armed forces of the Crown and returning to civil life will be a considerable number who, in the course of service abroad, have become infected with Malaria. As in the case of other discharged sailors or soldiers or members of the Air Force, these men will be entitled to receive treatment from an Insurance practitioner for this affection as for any other from which they may suffer. Moreover, if a case requires special knowledge and skill for its diagnosis or treatment, the services of specialists will be available (under arrangements made by the Pensions Ministry) after reference of the patient to a Pensions Referee. In respect of this disease, a new responsibility also devolves upon Medical Officers of Health to guard against its possible spread, and for this purpose it is essential that there should be thorough co-operation between the Medical Officers of Health, the Referees, and the practitioners treating patients.

For the assistance of all the medical officers and practitioners concerned in achieving these important objects, the Ministry of Pensions, after consultation with the other Government Departments concerned, has thought it advisable to issue this Memorandum, which it is hoped will be found helpful by those who have previously had little or no opportunity for observation of cases of Malaria.

The Navy and Army authorities have taken steps to secure, so far as practicable, that sailors or soldiers who have suffered from Malaria during their war service shall receive efficient treatment with a view to cure before their discharge to civil life, and that such men, during a month prior to demobilisation, shall undergo a daily course of quinine treatment under specialised supervision. Soldiers on leaving the Army will be advised by the Army authorities to continue treatment for a certain period after discharge. Those who follow this advice will report themselves to an Insurance practitioner or other doctor, who will thus have the opportunity to give them the necessary treatment with a view to averting, so far as possible, risk of relapse; some may come first under medical care when already suffering from relapses.

It will be realised that prompt and efficient treatment of all cases is important, not only in the interest of the particular patients, but also because, in places where Anopheline mosquitoes are abundant, such patients may provide a source from which other persons may eventually become infected.

In the preparation of the following suggestions, an endeavour has been made to bring within the smallest possible compass (con-

sistent with fulfilment of its objects) the particulars as to the nature of Malaria, the clinical and other characters of the disease, the lines of treatment found to be most successful, and the measures necessary for preventing its spread, with which it is essential that those undertaking treatment or measures of prevention should be thoroughly conversant; and the Minister of Pensions has no doubt that it will be most carefully perused and considered by all those to whom it is addressed.

When an ex-sailor or soldier reports his disablement from an attack of Malaria, the medical man in charge of the case should:—

- (a) Satisfy himself that the diagnosis of Malaria is correct;
- (b) Exercise such supervision over the treatment of the case as will ensure the cure of the attack within as short a period as possible.
- (c) Notify the attack to the Medical Officer of Health of the District under the Malaria, etc., Regulations, 1919, unless to his knowledge the case has been previously notified in the same district within six months. This notification should be given on the ordinary notification form. The fact that the patient contracted his malaria abroad should be stated on the form.

In compiling the following notes for the information of medical practitioners who have not had opportunities of studying malaria in the Tropics we have drawn largely upon an article by one of us which was published in the Public Health Reports to the Local Government Board, New Series, No. 119, 1918.

THE DIAGNOSIS OF MALARIA.

1. The most prominent symptom caused by an infection with malaria parasites is the occurrence of attacks of fever, which come on when the parasites "sporulate." These attacks recur at definite intervals corresponding to the length of time which the particular species of parasite concerned takes to complete its cycle in the red blood corpuscles of man. A parasite that takes 24 hours to grow to its full size and "sporulate" will produce an attack of fever every day (Quotidian fever), one which takes 48 hours will produce an attack every other day (Tertian fever), and one which takes 72 hours will produce an attack every fourth day (Quartan fever). If a parasite should for some reason or other complete its growth and division in a less period than 24, 48, or 72 hours, a different clinical type of fever will result, and a different clinical type may be produced by the presence in the blood of two or more groups of parasites which "sporulate" at different times or, at the same time, on different days.

2. Clinically, however, three chief types of malarial fever are commonly met with, namely:—

- (a) A comparatively mild type in which (counting the day of a febrile paroxysm as the first day) the febrile paroxysms recur with great regularity every third day, the intervals between the paroxysms being of 48 hours' duration. This type is produced by the Benign tertian parasite (*Plasmodium vivax*).
- (b) A severe type in which the paroxysms ought theoretically to recur every third day with the same regularity as in the first type, but in clinical practice are often found to recur every day and at irregular times. This is a type in which "pernicious" symptoms are liable to occur. It is caused by the Malignant tertian parasite, sometimes called the "subtertian" parasite (*Plasmodium falciparum*).
- (c) A comparatively mild type in which (counting the day of a febrile paroxysm as the first day) the febrile paroxysms recur with great regularity every fourth day, the intervals between the paroxysms being of 72 hours' duration. This type is produced by the Quartan parasite (*Plasmodium malariae*).

3. "Benign" Malaria.—The symptoms of a typical untreated case due to infection with one or other of the so-called "benign" forms of the parasite usually begin with passing attacks of chilliness, headache, and aching of the bones with slight rise of temperature. After these indefinite symptoms have gone on for a day or two, the patient will probably one morning get a definite attack of shivering, followed by feverishness, which will pass off with unusual sweating. The next day he may feel well again, but on the next he will have another attack of shivering, heat, fever and sweating—and this time more pronounced than the first attack. Thereafter the regularly recurring attacks of "ague" will come on at definite intervals, usually of 48 hours (Tertian fever), but sometimes of 72 hours (Quartan fever), sometimes of 24 hours (Quotidian fever). Each attack is represented clinically by a "cold" stage, a "hot" stage, and a "sweating" stage. At the beginning of the cold stage the patient feels chilly; after a short time the feeling of cold spreads all over his body, and becomes so intense that his teeth chatter and he shakes from head to foot. His temperature, however, in spite of the feeling of cold, begins to rise. After a time the shivering stops and the patient begins to feel hot, the skin becomes dry and burning, and the temperature rises rapidly to 103° F. or 104° F. or more. After some hours the hot stage passes off, the patient begins to perspire profusely, the fever quickly declines,

and in a short time all the acute symptoms have disappeared and the patient feels almost well. As a rule, he is able to get up and go about his occupation until the next day but one, when he will have another attack similar to the first attack. If untreated, these attacks may recur every other day (or every two days or every day) for several weeks, gradually declining in severity as time goes on. Meanwhile, he has become pale, slightly jaundiced, and anæmic, and his spleen has enlarged. After an apparent cure, the fever may return at irregular intervals for two or three years or longer (relapses). Vomiting and pain and tenderness of the spleen are usual during each febrile attack.

Most paroxysms begin before midday and last about 8 or 10 hours.

4. “*Malignant*” *Malaria*.—In infections with the Malignant tertian parasite the signs are often not so clearly defined as in infections with the “benign” forms, and the term “malignant” is used because dangerous symptoms such as coma, delirium, hyperpyrexia and other complications are much more liable to arise in the course of an infection with this parasite than with the others. The parasite, like the Benign tertian, takes, as a rule, 48 hours to grow to its full size and “sporulate” in the corpuscles; and during the first few days this fact may be apparent on the temperature chart of a case. There is, however, according to some, a great tendency for these parasites to complete their cycle in a shorter time than 48 hours—often, indeed, they do so in as short a time as 24 hours—so that after a day or two the patient usually has an attack of fever every day. Again, there is a tendency for some of the individual parasites to complete their cycle quicker than others. As a result of this, it not infrequently happens that the temperature does not fall quite to normal for several days together, and the chart is remittent in character. In untreated, or inadequately treated, cases, the fever continues in this way for a week or ten days and then ceases, leaving the patient weak and anæmic, but otherwise apparently recovered. After an interval of apyrexia, varying from six days to a week or more, a second series of similar attacks of fever, exhibiting a quotidian (or, perhaps an indefinite tertian) periodicity, occurs; and these relapses may be repeated at more or less constant intervals of about ten days for three or four months, gradually getting shorter and less severe until they die out altogether, leaving the patient very anæmic and with an enlarged spleen.

5. The chief "pernicious" symptoms sometimes met with in cases of acute malarial fever are:—

<i>Referable to the abdominal viscera and alimentary system :—</i>	<i>Referable to the circulatory system :—</i>
Severe splenic and hepatic pain.	Fainting attacks and sudden heart failure.
Bilious vomiting.	
Hæmatemesis.	<i>Referable to the nervous system :—</i>
Choleraic diarrhœa.	Intense headache.
Dysenteric diarrhœa.	Irritability.
Melæna.	Delirium.
Jaundice.	Convulsions.
<i>Referable to the urinary system :—</i>	Epileptiform seizures.
Albuminuria and nephritis.	Unconsciousness.
Incontinence or suppression of urine.	Coma.
Hæmoglobinuria (Blackwater).	Collapse.
	Uncontrollable sweating.
	Uræmia.
	Hyperpyrexia.

It is important to note that, although these pernicious symptoms are more frequent in infections with the Malignant tertian parasite, any of them may occur in infections with the so-called "benign" forms.

6. Although, as stated above, the most prominent symptom caused by an infection with malaria parasites is *fever* of a definite and peculiar character, it sometimes happens that people with a considerable number of parasites in their peripheral blood have little or no fever, and no subjective symptoms nor obvious physical signs. From the point of view of diagnosis in the absence of a blood examination, such apparently trivial symptoms as a periodic feeling of chilliness, or a periodic unusual sweating, or headache, or neuralgia, may provide a clue to the nature of the attack.

7. After a succession of attacks of untreated, or *improperly treated*, malarial fever, some patients pass into the condition called "malarial cachexia." The following are the chief diagnostic characters of this condition:—

- Considerable enlargement of the spleen and severe anæmia are the obvious clinical "physical signs."
- Serious symptoms are usually absent unless the patient is also suffering from another disease.
- Periods of fever and illness alternate with periods of apyrexia and partial recovery.
- Chronic irregular "low" fever is not present; but during the pyrexial periods, if the temperature is recorded *frequently* and carefully, the periodicity characteristic of malaria can often be observed.

- (e) As a rule patients suffering from this condition are not emaciated, and, unless another disease supervenes, they do not go from bad to worse, but, after many relapses of fever, slowly recover.

DIFFERENTIAL DIAGNOSIS.

1. A diagnosis of malaria may be arrived at:—

- (a) On the clinical symptoms and signs.
- (b) On the results of a blood examination.
- (c) On the effects of therapeutic doses of quinine.

1. *Diagnosis by Clinical Methods.*—Among the clinical signs the important diagnostic character is periodicity of a tertian or quartan type. If the fever, *or any other symptom*, recurs at stated intervals of approximately 48 or 72 hours, the disease is almost certain to be malaria.

If the periodicity is quotidian the matter is quite uncertain. Suppuration in any part of the body, tuberculosis, and many other diseases or conditions may produce daily rises of fever accompanied by rigor and sweating. It is many years since Professor Thayer wrote that “the one process above all others which is confounded with malarial intermittent fever is pulmonary tuberculosis,” and Sir Patrick Manson has said much the same as regards liver abscess; “at one time or another, most liver abscess cases are drenched with quinine, on the supposition that the associated fever is malarial.” Nevertheless, there is one type even of quotidian periodicity from which a moderately certain diagnosis of malaria may be made, namely, the type in which the daily febrile paroxysm comes on before mid-day. If a patient has an attack of fever beginning at about the same time each day, between 2 a.m. and 11 a.m., he is very likely to be suffering from malaria.

2. *Diagnosis by Blood Examination.*—The nature of most cases of malarial relapse in men returned from the Eastern campaigns will be obvious from the history and clinical characters of the attack, and no confirmatory blood examination will ordinarily be required. But there will remain many cases in which the diagnosis is doubtful, and it must be remembered that the microscopic examination of the blood, when carried out by a practised observer (and especially if the blood specimen has been taken before any quinine has been administered to the patient), is the surest and best method of arriving at an accurate diagnosis. In every case of fever suspicious of malaria (even if the probability of its being malaria is remote) a blood film should be taken at the first opportunity and sent for report. Until the blood film has been taken quinine should not be administered, but, provided that satisfactory films have been obtained, it is not necessary to await the *result* of the examination before commencing to use the drug

TAKING THE SPECIMEN OF BLOOD.

For a microscopic examination to ascertain the presence of malaria parasites, the blood can be mounted on glass slides either in the fluid state (unstained) or it can be dried and stained. Fluid, so-called "fresh," specimens are invaluable for studying the parasites, but nowadays they are never used for routine diagnostic work. For this reason the method of preparing and examining them will not be described here.

To prepare dried blood films the only articles required are microscope glass slides, and a long straight surgical needle (preferably with the eye snipped off). Good films cannot be made unless the slides, needle, and the patient's finger are clean, quite free from grease, and *thoroughly dry*. The details of making a film are as follows:—

Polish the slide with a silk handkerchief. Clean the pad of the patient's finger-tip and thoroughly dry it. Prick it without hesitation, sharply but not deeply. Lay the needle down on the edge of the table so that it can be quickly picked up again. Rub off the drop of blood that has exuded from the pricked finger. Pick up the slide between the finger and thumb of your right hand, and then with your left hand press out a second drop of blood. Lower the slide so that the drop, as it exudes, will be received on the slide about an inch from one end. Release the patient, and, turning the slide over, take it between the finger and thumb of your left hand. Pick up the needle by its pointed end, and lay its shaft across the slide on, and in, the drop of blood, which will run along the needle. Press the shaft flat on the face of the slide and sweep it evenly along the whole length of the slide. Wave the slide in the air so that the blood may dry as rapidly as possible. When it is perfectly dry (not before) wrap it in a piece of paper on which all the particulars of the case are written.

The procedure of receiving the drop of blood on the slide, turning the slide over, taking hold of it with the left hand, picking up the needle, laying its shaft flat on the face of the slide in the drop of blood, making the blood run along the needle between it and the slide, and sweeping the needle over the face of the slide, should be performed rapidly, but steadily. The method is simple, but requires practice.

The naked eye characters of a good film made in this way are:—

- (a) The film should occupy the middle area of the slide and should be about two-thirds the length of the slide.
- (b) The distal end of the film should consist of "tails" or "tags" about half an inch from the end of the slide. This is obtained by using a blood-drop of the correct size.

(c) At least one edge of the film should be quite straight, and at a little distance from, and parallel with, the edge of the glass slide.

(d) The film should not appear too thick nor too thin. This is a problem of pressing the needle less or more lightly on the face of the slide when spreading the blood. If a patient is very anæmic, use less pressure.

For diagnostic purposes two films should be prepared in the above manner from each case. In the absence of other arrangements for specialist examination, the slides may be addressed to the Medical Department, Local Government Board, Whitehall, London, S.W.1, accompanied by the patient's name and the name and address of the sender, to whom the result of the examinations will be forwarded. The cover should be marked "*Malaria Specimen: Urgent.*"

3. *Diagnosis by the so-called "therapeutic test."*—The effect of therapeutic doses of quinine as a test of malaria is useful as a last resort when other methods of diagnosis have failed, but it should not be used as a routine method of endeavouring to arrive at a diagnosis. *A case of fever that resists doses of 10 grains of quinine given in solution three times on two successive days is most probably not a case of malarial fever.* This is the only deduction that can justifiably be made from the test. One must not conclude that a patient whose temperature has declined after receiving this treatment is necessarily suffering from malaria, because his disease might have been one in which the temperature would have fallen whether he had received the quinine or not. Therefore the test is useful only as a method of *excluding* malaria; and it should be used with caution, because large doses of quinine may be harmful to patients suffering from such diseases as typhoid fever, tuberculosis, etc.

4. In India and other malarious countries it is a common observation that diseases are diagnosed as malaria when they are not due to that cause. In England, on the contrary, recent experience is to the effect that cases of malaria are frequently diagnosed under the heading of some other (often obscure) disease. The following is a list of some provisional diagnoses made in England and other non-malarious countries in regard to cases subsequently proved to be malarial:—

Influenza.	Cerebro-spinal fever.
Simple continued fever.	Rheumatic fever.
Sandfly fever.	Plague.
Trench fever.	Valvular disease of the heart
"Pyrexia of uncertain origin."	("septic endocarditis").
Paratyphoid fever.	Disordered action of the heart.
"Coma."	Hæmorrhagic pancreatitis.

"Aphasia."
Epilepsy.
Neuralgia and Neurasthenia.
"Jaundice."
Dysentery.

"Convulsions."
Anæmia and debility.
"Worms."
"Not yet diagnosed."

5. On the other hand, of course, it must not be forgotten that in England, as in the Tropics, it has happened that in known malarial subjects all the symptoms in a serious illness have been thought to be due to malarial infection, when more thorough examination would have revealed the presence of another illness to which in part, or in whole, the serious symptoms were due.

TREATMENT.

1. In all diseases associated with fever an accurate diagnosis is essential for successful treatment. Therefore, when the diagnosis is at all doubtful it should be a rule not to give quinine to any patient suffering from fever until a blood specimen, suitable for obtaining evidence of the presence or absence of malaria, has been taken. But it is not necessary, nor is it always advisable, to await the result of the examination before giving quinine.

2. Quinine is an effective remedy in attacks of malarial fever, and its administration should be begun immediately the diagnosis is assured, irrespective of the stage of the attack or the height of the fever. But the drug will not act so efficiently (*a*) if the liver is sluggish or congested, (*b*) if the alimentary canal is coated with mucus or is otherwise in a disordered state, (*c*) if for this, or any other reason, the drug cannot be properly absorbed into the system.

3. To obviate these difficulties, (*a*) a smart purge should always be given on the day that the quinine treatment is begun; (*b*) the quinine should always be administered in solution in a prescription that will make the taste less unpleasant,* and will aid absorption and the normal working of the digestive functions; (*c*) the doses of quinine should be made up in a large amount of fluid rather than in concentrated form; (*d*) the patient should remain in bed until the treatment of the attack is completed.

4. The treatment of a case includes:—

Treatment of the attack; and

"After-treatment."

Especially in primary attacks the latter is as important as the former; and every medical man who has had charge of a malarial patient in his private practice in England should endeavour to

* The taste of quinine is quickly removed by masticating a piece of bread. (R.R.).

keep in touch with him during at least three years after the primary attack. When the disease has been overcome, apparently for good, it may occasionally show itself again in one or other of a variety of unexpected ways which may seem to be quite unconnected with the original infection.

(a) For the treatment of the attack, in addition to the immediate administration of quinine according to the principles just mentioned, the most important matter is that, however mild the attack may be, the patient should go to bed and should remain there for at least three days, and preferably for five days, while he is going through the course of quinine treatment prescribed.

A good routine quinine system for the treatment of attacks in adults is to give, three times daily on five consecutive days, ten grains of the sulphate or hydrochloride dissolved (with dilute acid) in at least two ounces of water. In the great majority of cases this treatment will cause the parasites to disappear and the fever to cease in from 24 to 72 hours, but it should be continued for five days. This completes the cure of the attack.

(b) Quinine should be given by the mouth whenever it can be administered and absorbed by that route, but occasionally vomiting is so persistent that this cannot be done, nor can it be done in some pernicious attacks when no time must be lost. In such cases the best method of treatment is to administer the quinine *intravenously*, but the operation requires good technique, great care, and strict aseptic precautions. Except when it is of importance to life that the patient should receive quinine at once, it is advisable not to attempt the intravenous injection of quinine until the simpler operation of withdrawing blood into a syringe from small veins has been well practised.

Method of Administering Quinine intravenously.—The following articles are required for the administration:—(1) An all-glass syringe of 5 c.c. capacity and with a new needle, which must be very sharp; (2) tablets of a salt of quinine soluble in water, preferably quinine bi-hydrochloride; (3) a spirit lamp, tripod stand and porcelain dish; (4) test-tubes, filter papers, alcohol and lint, and a pair of forceps; (5) normal saline solution made up with pure distilled water; (6) a measure glass marked in c.c.'s. All the articles with which the injection is made should be thoroughly sterilised before use, and the patient's arm rendered aseptic.

The following are the details of the operation:—(1) In a sterilised measure glass dissolve 15 grains of quinine bi-hydrochloride in 5 c.c.'s of normal saline solution; (2) filter it into a sterile test-tube and boil it; (3) if quite clear, pour it into the sterile porcelain dish and draw it up into the syringe, which it

should completely fill; (4) the patient should be lying in bed. By applying a bandage make the median basilic vein as prominent as possible. Do not attempt the operation unless the vein is standing out prominently; (5) see that the needle of the syringe is firmly attached, and that it is completely filled with the quinine solution; (6) let a drop of the solution fall on the skin over the vein at the spot selected, and through it pierce the skin and the anterior wall of the vein; (7) turn the needle point towards the patient's shoulder and push it onwards until at least half the needle is lying freely in the lumen of the vein; (8) remove the bandage and let the arm be relaxed so that the blood in the veins can flow freely; (9) make certain that the needle is in the lumen of the vein by withdrawing a few drops of blood into the syringe; (10) If this is the case, without moving the point of the needle, inject very slowly one c.c. of the solution and wait a few moments. If the needle is correctly in the vein, there will be no swelling at the site of injection and the patient will feel no pain there; (11) inject slowly another c.c. and wait again, and proceed in this manner until all the solution is injected.

The two most important points are that the needle should be in the lumen of the vein and that the injection should be made very slowly. If the needle misses the vein, or slips out of it, stop the injection at once, and, before withdrawing the needle, suck back into the syringe all the solution that may have escaped into the subcutaneous tissue round the vein. Then with another syringe and fresh solution make the injection into another vein.

One dose of 15 grains given intravenously is usually sufficient to stop the fever and to cause the disappearance of most of the parasites within 24 hours. Vomiting and other acute symptoms usually subside within a few hours, so that quinine can then be given by the mouth in the manner described above. If vomiting still persists, a second injection should be given 12 hours after the first. If one is not prepared to give quinine intravenously when it cannot be taken by the mouth, the next best thing to do is to administer it *intramuscularly*. The arrangements and dose are the same as for intravenous injection, but the operation presents no difficulty. The stab should be made deeply into the gluteal muscle and the solution injected, the little wound made by the needle being closed with collodion.

The objection to intramuscular injections of quinine is that occasionally they produce an abscess at the site of the injection, or injure a nerve.

Subcutaneous injections of quinine frequently cause abscess and sloughing of the tissues, and should not be employed.

(c) "*After-treatment.*"—Except when a relapse is of an unusually severe character, the patient should be fit to return to his ordinary mode of life when the treatment of the attack is concluded. Thereafter he should live in as normal a manner as possible, and should during three months take quinine regularly according to one or other of the following plans of "*after-treatment*":—*

- (a) 10 grains of quinine once daily at dinner-time or at bed-time; or
- (b) 30 grains of quinine on each of two consecutive days, e.g., Saturday and Sunday each week; or
- (c) 30 grains of quinine every Sunday, the amount being taken in three doses of 10 grains each, the first in the early morning, the second at midday, and the third in the evening; or
- (d) 30 grains of quinine taken as in (c), but every tenth day instead of every Sunday.

The choice of the particular method to be adopted must be made by the patient's medical attendant who knows the circumstances and character of the individual case. The method of choice will usually be the one which it is thought the patient will be most likely to carry out conscientiously. In the tropics, many sufferers from malaria find that to take a daily dose of ten grains is a habit easy to acquire, and one that keeps them almost entirely free from relapses. This plan, when properly carried out, has also proved very successful in reducing the frequency of relapses among severely infected soldiers from the Eastern war areas. On the other hand, among less heavily infected civilians in England, the plan of one day's treatment every week or every ten days has been quite successful, and in most cases has been described as less irksome than the daily dose. In any approved method of "*after-treatment*" by quinine, the degree of success attained depends more on the arrangements for ensuring that the routine is conscientiously followed than on the particular method chosen.

It has been found that patients who carry on their usual employment while going through a course of after-treatment, especially if their duties involve regular work or exercise in the open air, do much better than those who are kept on the sick list for a considerable time after each relapse.

If in spite of taking quinine according to one or other of the above systems of after-treatment, a patient has a relapse of fever, or if, even without a relapse, malaria parasites are found in his

* Of the many systems of after-treatment which have been recommended from time to time only four are mentioned here. Supplementary notes and information of results in connection with different methods will be issued from time to time by the War Office and Ministry of Pensions.

blood, he must go to bed, and go through, first the five-day course of treatment for the attack, and thereafter the course of after-treatment for three months, just as though his relapse had been a new infection.

THE PREVENTION OF INDIGENOUS INFECTION.

1. The Insurance practitioner will have discharged his duty to the individual malaria patient, and will have taken the most essential step to prevent local spread of the disease if, after confirming the diagnosis, he has adopted all practicable means for the effective treatment of the case, and has notified the Medical Officer of Health as required by the Regulations quoted in the Appendix to this memorandum, stating also whether or not the disease was contracted abroad.

2. The duties of the Medical Officer of Health, on receipt of the notification, need not be detailed here. Ordinarily they consist in making such enquiries as are necessary to satisfy him that the case is not of indigenous origin, and is not occurring under circumstances in which infection is likely to spread. If he is not so satisfied special steps have to be taken as indicated in the Orders and Reports issued by the Local Government Board. It is important, of course, that all medical practitioners should co-operate to the greatest extent in the special measures which in any cases under their charge are, for this purpose, considered necessary by local health authorities or by the medical officers or inspectors of the Local Government Board.

APPENDIX.

NOTIFICATION OF MALARIA.

The following are relevant extracts from the Public Health (pneumonia, malaria, dysentery, etc.) Regulations, 1919, of the Local Government Board :—

Article II.—These Regulations shall come into operation on the First day of March, One thousand nine hundred and nineteen, and shall then and thereafter apply and have effect throughout England and Wales, and shall be enforced and executed by every Local Authority.

* * *

DUTIES OF MEDICAL PRACTITIONERS.

Article V.—* * * Every Medical Practitioner, as soon as he becomes aware that a person upon whom he is in professional attendance is suffering from malaria, * * * shall forthwith make and sign and send or deliver to the Medical Officer of Health a notification of the case in the form and containing the particulars set forth in Schedule A. or Schedule B. as the case may be, of the Public Health (Notification of Infectious Disease) Regulations, 1918, and shall transmit the notification to the Medical Officer of Health for the District :

Provided that a Medical Practitioner shall not be required to notify a case of Malaria, * * * under this Article and shall not be paid a fee for so doing if the case has already, to his knowledge, been notified under these Regulations or under the Infectious Disease (Notification) Act, 1889, within the period of six months immediately preceding the date on which he first becomes aware of the disease in that case.

DUTIES OF MEDICAL OFFICERS OF HEALTH.

Article VI.—A Medical Officer of Health on receipt of a notification under these Regulations in relation to a case occurring in a place which is not in his District shall forthwith notify the Medical Officer of Health of the District in which the place is situated.

Article VII.—Upon the receipt of a notification under these Regulations, or on becoming aware in any other way of a case or suspected case of Malaria, * * * in his District, the Medical Officer of Health, or an Officer of the Local Authority acting under the instructions of the Medical Officer of Health, shall make such inquiries and take such steps as are necessary or desirable for investigating the source of infection, for preventing the spread of infection, and for removing conditions favourable to infection, and

if a Medical Practitioner is not in attendance on the patient, the Medical Officer of Health shall also take such steps as are necessary or desirable for ascertaining the nature of the case.

Article VIII.—The Medical Officer of Health, on becoming aware of the occurrence within his District of—

(a) * * *

(b) a case of malaria in which he has reason to believe that the infection was contracted in the United Kingdom, shall immediately send to Us (the Local Government Board) the name and address of the patient.

* * *

Article IX.—In every case of Malaria, * * * in his District of which he becomes aware, the Medical Officer of Health shall take such steps as appear to him to be necessary and practicable, to secure the treatment of the case in a suitable hospital, unless he is satisfied that treatment elsewhere than in a hospital will be carried out with all such precautions as are necessary to prevent the spread of the disease.

Article X.—In every case of malaria occurring in his District of which the Medical Officer of Health becomes aware, *and in which he considers that action is necessary to prevent the spread of infection*, he shall take all practicable steps to ensure that the person suffering from malaria—

- (1) is supplied with efficient mosquito netting,
- (2) receives necessary quinine treatment,
- (3) receives proper advice as to the continuation of quinine treatment in order to prevent relapses, and
- (4) receives proper advice as to the precautions to be taken to prevent the spread of infection.

Article XI.—On the occurrence within a District of two or more cases of malaria *in which the infection has, in the opinion of the Medical Officer of Health, been contracted within the District*, the Local Authority may and if required by Us shall appoint and pay a Medical Practitioner approved by Us, who shall:—

- (1) make systematic visits to houses where Malaria has occurred or where risk of malaria infection arises, and shall offer to examine persons therein who are suspected of being infected with malaria, and shall endeavour to obtain material for microscopic examination in order to determine whether malarial infection is present, and
- (2) secure that effective measures are taken to prevent the spread of infection by the administration of quinine, by the use of mosquito netting, and by the destruction of mosquitoes, and otherwise.



